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FRISCO CHARCOAL KILNS
STATE ROUTE 21
FRISCO
MILFORD VICINITY
BEAVER COUNTY
UTAH

HAER No. UT-25

HAER
UTAH,
1-FRIS,
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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
NATIONAL ARCHITECTURAL and ENGINEERING RECORD
NATIONAL PARK SERVICE
DEPARTMENT of the INTERIOR
WASHINGTON, D.C. 20243

FRISCO CHARCOAL KILNS

HAER No. UT-25

NAME: Frisco Charcoal Kilns

LOCATION: Frisco, Beaver County, Utah
Approximately 16 miles west of Milford, Utah

UTM: 12/302600/4259100 -- Frisco Quadrangle

OWNER: Tintic Minerals Resources, Inc. &
Horn Silver Mines Co.
c/o Mr. Page Blakemore, Sr.
1020 Newhouse Building
Salt Lake City, Utah 84101

YEAR BUILT: 1877

ORIGINAL OWNER: Frisco Smelting Company

PREPARED BY: Phil Notarianni, Historian
Preservation Office
Utah State Historical Society

DESCRIPTION:

The Frisco Charcoal Kilns site is composed of five beehive charcoal kilns that were built in 1877. For descriptive purposes the kilns have been numbered from one to five (see sketch map). Kilns number 1 and 4 are in partial ruin, with approximately one-half to one-third of their tops having collapsed. The others remain almost intact. Their location is on a hill adjacent to the site of the Frisco Smelter. Only several partial foundations remain of the smelter structure itself -- smoke stack structures. They remain among the best surviving charcoal kilns in Utah that documents the state's early mining history.

The kilns were built of granite float and a lime mortar in random rubble construction. Built in a form of a parabolic dome, kilns number 1, 3, 4, and 5 are blunted at the top, whereas the top of kiln 2 rises to a point. Kilns 1, 3, 4, and 5 are approximately 22 feet in height and measure respectively, 21 feet, 21 feet, 21 1/2 feet and 22 feet in diameter. Kiln 2 is 22 feet 9 inches high and 23 1/2 feet in diameter. All five kilns have arched front openings at ground level and arched openings on the other side approximately 2/3 of the distance to the apex. The front openings range in the area of 6

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feet high and 4 feet wide, and slant inward on all kilns, thus the exterior dimensions are larger than the interior, an average of 8 inches difference on the width and 1 inch on height. The other openings on the side are all approximately 3 by 4 feet. Rock work around the arched openings is visible on all kilns, either front or side or both, including the keyways.

There are three rows of air vent holes, each hole being approximately 3 by 4 inches, and each row 1 1/2 feet apart on all kilns. The first row of vents has been partially covered by a rising ground level. Vertically, the rows are also approximately 1 1/2 feet distant. Remnants of wood logs, used as stops for the vents, were found in some of the holes. Kilns 1, 3, 4, and 5 have a 1-foot ledge located approximately 11 feet from ground level. Kiln 2 has an 8-inch ledge about 7 feet from its base.

Geographically, the kilns are arranged in semi-circular fashion, and are spaced as follows:

Kiln 2	-	4 1/2 feet from #1
Kiln 3	-	15 feet from #2
Kiln 4	-	6 feet from #3
Kiln 5	-	5 feet from #4

A hill runs behind the kilns, approximately 2 to 4 feet away from their bases, and is nearly level to the ledges of the kilns.

The kilns are in a deteriorated state, with numbers 1 and 3 partially collapsed. However, they appear much as they did when in use (as determined from an historic photograph) and considering their proximity to a state highway are in generally good condition. The iron doors which covered the front and upper side openings are gone. A trace of white stucco material, probably used to cover the exterior surface, still remains on kilns 3 and 4. Kiln 5 exhibits three sections where an apparent patch-work of soft red firebrick was added (no date). These exist over the upper archway of the front door and on the upper east and north sides, just above the 11-foot high ledge. The brick is approximately 9 1/2 inches long, 4 1/2 inches wide, and 2 1/4 inches thick. Interior walls are glazed with a black substance, a residue of their use in the charcoal burning process.

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Presently the kilns are abandoned. Tintic Minerals Resources, Inc. and the Horn Silver Mines Co. are interested in the possibility of placing a fence around the kilns. A title search of the property is presently (September 1981) being conducted by the companies to establish firmly ownership of all surrounding property. Plans are also underway to reopen the Horn Silver Mine, west of the Kilns. The owners are desirous of preserving the kilns and protecting them from potential harm. There are no plans however, for any stabilization work to be done on the structures.

Dimensions for particular features of each kiln are as follows (for an historical description of the kilns, see the history):

KILN #	HEIGHT	DIAMETER	WALL THICKNESS	FRONT OPENING	SIDE OPENING
			AT BASE		
1	ca. 22'	21'	2'	4'6" X 6'8"	Gone
2	22' 9"	23 1/2'	2'	4'6" X 6'2"	3' X 4'
3	ca. 22'	21'	2'	4'7" X 5'5"	3'2" X 4'
4	ca. 22'	21 1/2'	2'	4'9" X 5'8"	Gone
5	ca. 22'	22'	2'	4'8" X 6'4"	3' X 4'

SIGNIFICANCE:

The five beehive Frisco Charcoal Kilns, built in 1877 by the Frisco Smelting Company, are significant as among the few remaining charcoal kilns in the state of Utah that retain much of their visual integrity, and help to document the state's early mining history. The structures, three of which are nearly intact, were constructed of granite float in the form of a parabolic dome, and are significant remnants of Utah's charcoal industry, as well as excellent examples of the engineering techniques of kiln construction. The Frisco kilns were among the earliest built, and excluding several kilns that may exist high in the mountains near Frisco, are the best remaining in the state of Utah. In addition, they are the best documented kilns of any in the state.

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HISTORY:

The San Francisco mining district is located in Beaver County, some 17 miles west of Milford (approximately 225 miles south southwest of Salt Lake City). Its area embraces about 7 square miles, situated upon both flanks of the San Francisco mountains. The district itself was organized August 12, 1871, and became prominent as a producer of silver and lead beginning in about 1876. Water in the area was considered "very bad and scarce;"¹ and in time, this same observation was made regarding wood for fuel. In addition, Frisco was linked to the mining efforts in eastern Nevada in terms of geographical proximity, time, and labor.

The effective beginnings of the prospecting and exploitation of Utah's precious metals is linked to the early 1860s. Commencing with the efforts of prospector-soldiers under the leadership of Colonel Patrick E. Connor, who with the California and Nevada Volunteers entered the territory in 1862, the area's real commercial mining development awaited the completion of the transcontinental railroad in 1869. Throughout the 1860s and 1870s mining claims were filed and mining districts established in various regions of the territory. In the north, important districts were located at West Mountain (Bingham Canyon), Big and Little Cottonwood Canyons, Park City and the Ophir and Mercur areas of Tooele County. Silver Reef, in Washington County, organized in 1874, became an active producer of silver-lead ores. The central region was dominated by the Tintic District (1869), and the districts of Beaver County, especially the Frisco Mining District, which proved to be of signal importance to the growth of that county. Thus, the Frisco District was an early and important link in the nascent mining industry of Utah.

The town of Frisco became the commercial center for this district, and the terminus of the Utah Southern railroad extension from Milford. In 1880 the population was enumerated at about 800 people.² At that time the two largest mining enterprises were the Horn Silver Mining Company, and the Frisco Mining and Smelting Company, who built the five remaining charcoal kilns that still stand near Frisco as stark reminders of past technology, needs, and industry.

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Frisco's main mines in the late 1870s through the 1880s were the Horn Silver Mine and Carbonate group of mines, the latter being owned by the Frisco Mining and Smelter Company. With the development of these mines, made possible primarily because of the extension of the Utah Southern railroad to Frisco in 1880, came prosperity and growth. The Frisco Smelting Company began expanded construction in Frisco in July, 1877. Corresponding to the successful working of the Horn Silver mine. It was at that time that the smelting works were built, including in all probability, the five beehive charcoal kilns needed to provide fuel for the smelter.³

The Frisco Smelting Company was headed by W. S. Godbe, manager; Benjamin Y. Hampton, superintendent; and M. Atkins, agent.⁴ It was Hampton who supervised the construction of the smelter, which was reported running in September, 1877;⁵ again primarily with ore from the Horn Silver mine. In September, 1879 the Frisco Mining and Smelting Company incorporated representing a reorganization of the Frisco Smelting Company. The Frisco Mining and Smelting Company had a capital stock of \$2,000,000 in 80,000 shares, with property that included the smelting plant at Frisco, the Carbonate group of mines located about 2-1/2 miles northeast of town, the Cave mine in the Bradshaw district (nearer to Milford), and an iron flux mine in the Rocky district.⁶ In 1880 the general manager of the company was C. D. Bigelow.⁷

An 1880 report on the Frisco Mining and Silver Company described the smelting plant as a "complete one," containing a Blake rock-breaker, a Number 5 Baker blower, two horizontal boilers, one 40 horse-power horizontal engine, several pumps, a shaft furnace and flue-dust chamber, a reverberatory flue-dust slagging furnace, and five charcoal kilns" adjacent to the works."⁸ These are the kilns that remain in Frisco.

Charcoal was a necessary fuel for smelting, which made mining more profitable by enabling the mining company to work the ores closer to their working site. In the process of making charcoal "pits" were first utilized. In 1880 pits were still used in the Frisco area, primarily in the Wahwah Mountains, west of

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town.⁹ These were conical-shaped pits in the ground, usually lined with stone or brick. Wood was then put inside, placed on fire, and covered with earth and sod, and allowed to smolder for 15 to 20 days, eventually burning itself out. The product was a black, porous residue of wood with all organic matter removed, leaving almost pure carbon. It would burn in smelter furnaces without smoke, producing an intense heat.¹⁰

During the 1870s, the trend turned from pits to kilns, constructed of stone or brick. This represented a capital investment and an original cost to the company of from \$500 to \$1000, but was offset by the fact that it proved more efficient, less wasteful, and produced a higher quality of charcoal.¹¹ The engineer credited with introducing the beehive kiln was J. C. Cameron, in Marquette County, Michigan, in 1868. Cameron, in an article in the Utah Mining Gazette stated that he indeed introduced the kiln, and described them as in a form of "a parabolic dome, with a base of twenty to twenty-four feet in diameter and altitutde of nineteen to twenty-two feet." He estimated the cost at not to exceed \$700.¹² These kilns were probably constructed with the use of internal scaffolding against which the walls were laid as they slanted towards the top of the dome.

The five Frisco charcoal kilns of the Frisco Mining and Smelting Company were among those described extensively in the 1880 census mineral compendium. That description including a discussion of charcoal burning in Frisco was as follows:

The kilns are made of granite float found in the neighborhood and a lime mortar. They are of various sizes, from 16 to 26 feet in diameter. It is the rule in this section to make the height of the kiln equal to the diameter. The thickness varies from 18 to 30 inches at the base and from 12 to 18 inches at the summit. There are two openings, closed by sheet iron doors, one at the ground level, 4 by 6 feet, and the other in the side two-thirds of the distance to the apex, 3 by 4 feet. There are also three rows of vent holes, 3 by 4 inches, near the ground. The lower row is at the surface of the ground. The rows above

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are 18 inches apart, having vent holes 3 feet apart in each row. The kilns cost from \$500 to \$1,000 each, and lasted a very long time if used regularly. The 16-foot kiln holds about 15 cords of wood and the 26-foot kiln 45 cords. Sometimes the wood is piled radially, but generally very closely in cord-wood fashion. The wood is all pinon pine, and is cut at all seasons by Mormons at \$1.25 per cord. It is brought from 1 to 4 miles by sledges or wagons to kilns for from \$1.50 to \$2.50 per cord. The kilns are fired in the center at the bottom (though sometimes at the top), and the fire is drawn to the top by leaving a small unsealed space around the upper door. This is then closed entirely, and the fire is regulated by the vent holes. The duration of burning is from three to seven days, and of cooling from three to six days. Charring, which includes packing the wood in the kiln and drawing the coal, is usually done by contract, and costs from 2 3/4 to 3 1/2 cents per bushel. About 50 bushels are produced per cord charred. The coal is bought by weight, 17 pounds making a bushel. It is shipped to the smelters in racks, at a cost of from 3 to 5 1/2 cents per bushel for hauling, depending on the distance. The price received is 18 cents per bushel. Kiln hands are paid from \$2 to \$2.75. The labor required averages one man per kiln per twenty-four hours.¹³

In 1882 a specific description of the five kilns appeared in The Engineering and Mining Journal. At that time charcoal sold for 16 cents per bushel. The report stated:

Each kiln burns at one time 32 cords of wood, making from 1200 to 1500 bushels of charcoal-pinon pine, at a cost of \$6 per cord, being used. It takes from six to ten days to burn a kiln. The company uses about 30,000 bushels of charcoal per month, besides about ten cords of cedar wood per day, at a cost of \$3 per cord.¹⁴

Scrutiny of the 1880 manuscript census--population schedule--aids in an understanding of the Frisco charcoal industry. The stages in the production of charcoal have been defined as kiln construction, wood cutting and hauling, charring, and freighting to the smelters. The Frisco Mining and Smelting Comapny had their five kilns next to the smelter; thus, alleviating the cost of freighting. According to the census, taken in June, 1880, there were in

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Frisco 4 coal contractors and 21 coal burners. In addition, 7 stone masons, 1 brick mason, 2 wood contractors, and 5 wood choppers appeared on the roles. In the case of the coal contractors, their average age was 42, whereas, the coal burners averaged 27 years of age. Fourteen of the 21 burners were single men, and most resided in multi-family households, probably boarding or lodging houses. In several cases persons of related charcoal burning tasks lived in the same household, but not exclusively.¹⁵ This case points to the opposite view that charcoal hands lived under worse housing conditions than did other mine employees.¹⁶

Coal burners were exclusively either from the United States or from northern European countries. Seven burners were listed as born in Utah Territory. One family, the Angels, from England, numbered four brothers, all coal burners. The coal contractors were all born outside of Utah--two in Illinois, one in Ohio, and one in Germany.¹⁷ Charles Lamendorf, from Germany, was also active in the Tintic Mining District in Juab and Utah counties. Thus, the charcoal industry in Utah, as were most mining-related enterprises, was a product of importation into the territory by others experienced in the field.

Smelting activity of the Frisco Mining and Smelting Company reached its highest during the years 1879-1884. The following are the tonnages of ore and concentrates from the Carbonate-Rattler mines treated at the Frisco smelter from 1879 to April 1, 1884:

1879-1880	130,759
1881	648,295
1882	1,785,260
1883	961,874
Jan. 1 to April 1, 1884	78,862 ¹⁸

In 1878 the smelter's furnaces had treated 222 cars of bullion from the Bonanza and Cave mines--4,669,828 pounds of lead, 284,820 ounces of silver, and 526-1000 ounces of gold, for a value of \$417,470.25.¹⁹ The Salt Lake Tribune, in June, 1881, stated that in Frisco, "The demand for charcoal is now

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greater than the supply, and all the kilns in these parts are crowded to their utmost capacity." During 1882 the smelter was reportedly working nearly 20 tons of ore daily from the Cave mine alone.²⁰ Therefore, during the 1877 to 1884 period the Frisco charcoal kilns were at their peak of production. Factors intervened to change the nature of the charcoal and the smelting industry in Frisco. Charcoal became an expensive fuel. As of March, 1879 the total cost of smelting one ton of ore amounted to \$18.54 for the Frisco Smelting Company. Of this amount, charcoal accounted for \$8.37; or about 45 percent of the total. Labor, the second largest cost, was \$4.25 per ton of ore smelted. The ore smelted required about 46 bushels of charcoal per ton. Forty-six bushels translated into one cord of wood. The 1882 report cited earlier stated that 30,000 bushels of charcoal were used per month, or approximately 652 cords of wood. In addition, 10 cords of cedar wood were used per day for roasting the ore.²² As wood reserves dwindled, the cost escalated.

The increasingly cheaper freight rates, coupled with the growing coke industry in Utah, made coke a cheaper and better fuel. During 1886 railroad competition in transporting coke from Pennsylvania and San Francisco to Utah had brought the price of the commodity down.²³ In addition, during the early 1880s, the Denver and Rio Grande Railroad opened the vast coal fields of what was to become Carbon County; and in the latter years of that decade, Castle Gate coke would be produced as an excellent fuel. Sunnyside coke would follow.

High labor costs, lack of water, inferior and highly priced charcoal, and the lack of good fluxing ore (ore containing fluxing agents--those that assisted in fusion--required in the reduction of richer ores), all prompted the Horn Silver Mining Company to cease smelting operations at Frisco in 1882. During 1881 the company had erected a smelter which burned coke at Francklyn, some 6 1/2 miles south of Salt Lake City.²⁴ Smelters in the Salt Lake Valley began to come into prominence, especially with competing railways and cheaper freight rates.

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Effected by the above conditions, the Frisco Mining and Smelting Comapny closed and dismantled its smelter in 1884. The kilns remained, with no explanation as to why. Output from the company's mines were being sent to Salt Lake smelters, and some later to the Tintic smelter.²⁵ Production figures cited by Bert S. Butler go to April 1, 1884 (as cited), and then from April 1, 1884 to December 31, 1909 (6,052,050 tons).²⁶ Thus, these figures apparently represented those compiled before and after smelter closure.

Post-1884 witnessed sporadic and limited work with the Frisco Mining and Smelter Company property. In 1886 the Carobonate dump and tailings pile were being concentrated by leasers, and one G. S. Handy was working over a portion of the company's slag dump, shipping 283,280 pounds of matte (a brittle product obtained in the smelting of sulphide ores).²⁶ By 1892-93, the Frisco Mining and Smelting Company was no longer listed in the Utah Gazetteer. To 1900 the Horn Silver Mine was the only producer in the Frisco area.²⁷

In 1901 the Carbonate and Rattler Mining Company incorporated based on a bond held on the Carbonate and Rattler mines, then "old" properties of the Frisco Mining and Smelting Company. The property underwent further development, but in 1914 it was sold under a sheriff's sale to foreclose a mortgage held by the Horn Silver Mining Company.²⁸ Little is known about the later disposition of the property, but by 1933 the major part of the Frisco area was controlled by the Tintic Lead Company.²⁹

The kilns, however, have survived the vicissitudes of the mining industry and time, and allow the present-day observer a glance at past technology and life. As stated in the conclusion of an anthropological study of Colorado's cultural resources, these kilns in Utah need both archaeological and historical analysis for further illumination.³⁰ In the case of the Frisco charcoal kilns, the potential for obtaining further knowledge through historical archaeology is indeed good. These five kilns stand as among the earliest and best preserved charcoal kilns identified in the state of Utah.

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¹D. B. Huntley reported on the mines in Utah, U.S. Dept. of the Interior, Tenth Census, 1880, Col. 13, "Precious Metals," (Washington, D.C.: GPO, 1885), p. 464.

²Ibid.

³Salt Lake Tribune, July 1, 1877.

⁴H.L.A. Culmer, Utah Directory and Gazetteer for 1879-80 (Salt Lake City: H.L.A. Culmer and Company, 1980), p. 329.

⁵Salt Lake Tribune, July 1, 1877; and September 2, 1877.

⁶Tenth Census, Vol. 13, pp. 469-470.

⁷Salt Lake Tribune, January 1, 1881.

⁸Tenth Census, Vol. 13, p. 470.

⁹Ibid.

¹⁰Nell Murbarger, "Forgotten Industry of the West," Frontier Times (May, 1965), p. 26.

¹¹ Ibid.

¹²The Utah Mining Gazette, July 25, 1874, p. 381.

¹³Tenth Census, Vol. 13, p. 471.

¹⁴The Engineering and Mining Journal (New York), November 18, 1882, p. 273.

¹⁵Tenth U.S. Census, 1880, Utah, "Population Schedules," Beaver County, Film A-147, Utah State Historical Society.

¹⁶Murbarger, Forgotten Industry, p. 26.

¹⁷Tenth Census, "Population."

¹⁸Bert S. Butler, Geology and Ore Deposits of the San Francisco and Adjacent Districts, Utah, Professional Paper 80 (Washington, D.C.: GPO, 1913), p. 178.

¹⁹Salt Lake Tribune, January 1, 1879.

²⁰Salt Lake Tribune, June 22, 1881; and January 1, 1883.

²¹Tenth Census, Vol. 13, p. 470. W.A. Hooker, E.M. The Horn Silver Mine Report, March, 1879, p. 27. This report is located in Special Collections, Marriott Library, University of Utah.

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²²Ibid., p. 469. The charcoal was described here as "inferior" in quality to that used in the northern part of the territory.

²³Salt Lake Tribune, January 1, 1887.

²⁴Salt Lake Tribune, January 1, 1882; Butler, San Francisco and Adjacent Districts, p. 114; and Tenth Census, Vol. 13, p. 469.

²⁵Salt Lake Tribune, January 1, 1885; Butler, San Francisco and Adjacent Districts, p. 178; and Beaver County News, November 12, 1909.

²⁶Salt Lake Tribune, January 1, 1887.

²⁷Salt Lake Mining Review, December 30, 1900, pp. 27-28.

²⁸Salt Lake Mining Review, May 30, 1901, p. 22; May 15, 1907, p. 30; May 30, 1909, p. 30; September 15, 1909, p. 36; January 15, 1914, p. 7; and February 15, 1914, p. 30.

²⁹Allan R. Reiser, "Geology and Major Ore Deposits of the San Francisco Mining District," (B.S. thesis, University of Utah, 1933), p. 2.

³⁰See, William G. Buckles, ed. Anthropological Investigations Near the Crest of the Continent, Vol. III (1975-1978). Copy located in the Antiquities Section, Utah State Historical Society.

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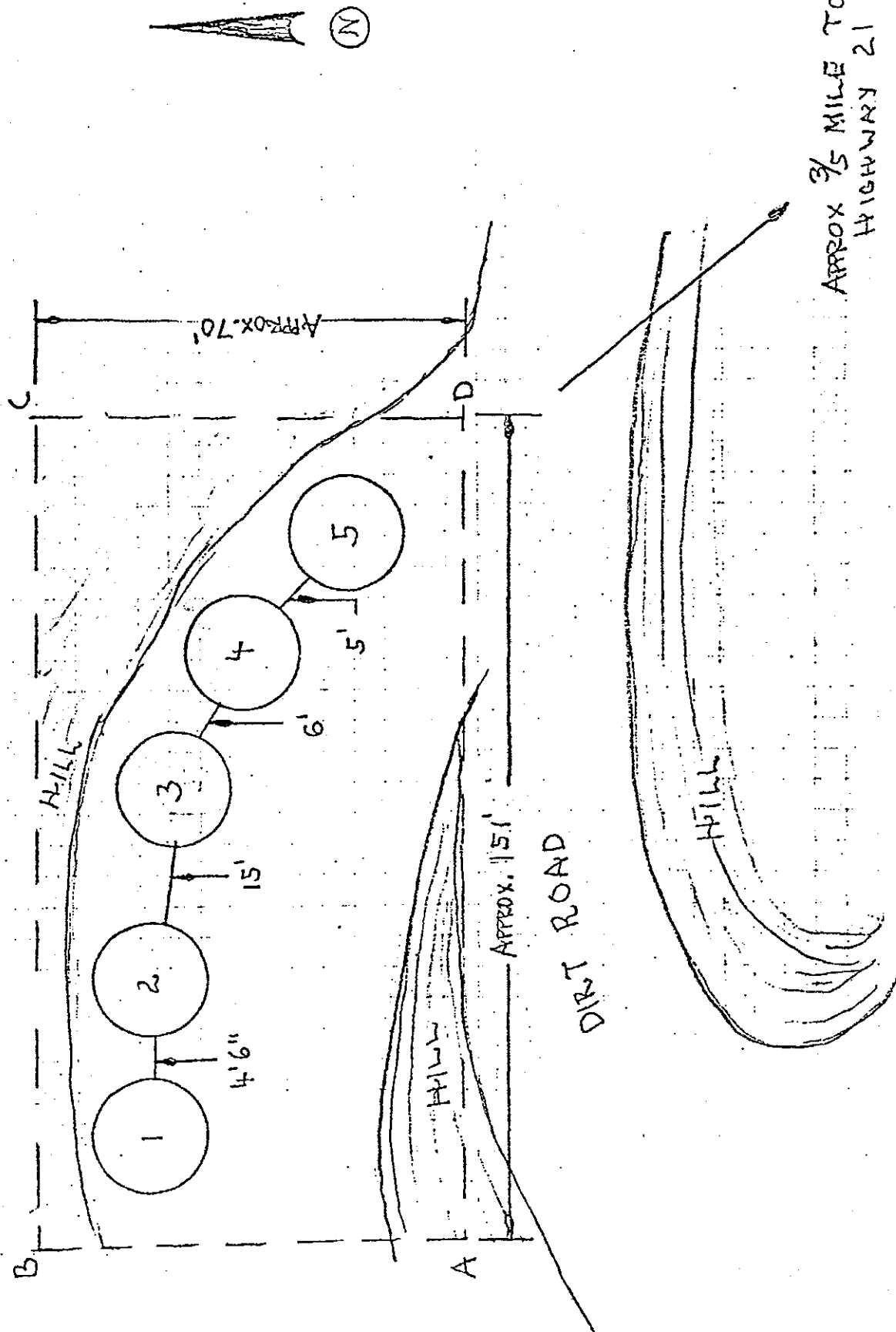
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FRISCO CHARCOAL KILNS SITE SKETCH



VERBAL BOUNDARY DESCRIPTION:

Point "D" of the Frisco Charcoal Kilns National Register property is approximately 1/2 mile northwest of the southeast corner of Section 13, Range 13 West, Township 27 South. The property then continues West approximately 151 feet to point "A", then approximately 70 feet North to point "B", then East approximately 151 feet to point "C", then South to the point of beginning.

The boundary is justified as that area immediately surrounding the five charcoal kilns where the owner would like to put a fence so as to protect the site from scavengers. The old smelter site, immediately south of the kilns, contains only several partial foundations and has been picked-over by souvenir hunters and therefore, has not been included in the nomination. The old town site of Frisco has also been severely potted by bottle hunters.